Weather Note

TORNADOES NEAR NAGS HEAD, N.C. JULY 1959

FRANK B. DINWIDDIE

Weather Bureau Cooperative Hurricane Reporting Observer, Nags Head, N.C

[Manuscript received September 15, 1959; revised October 10, 1959]

On July 10, 1959, at 1300 EST, a tornado was seen to form over the mile-wide barrier beach at Nags Head, N.C., a little less than a mile from the observer's house (fig. 1). The center of tropical storm Cindy was then about 75 miles to the west-northwest, moving northeastward. Surface conditions at the time were: wind south with gusts to 52 m.p.h., sea level pressure 29.79 inches, temperature 82° F., dewpoint 72° F., and cloud base level about 2250 feet. A loosely formed band of cumulus congestus was overhead, oriented southwest by south to northeast by north, and a heavy rain shower with no thunder was just passing over to the north (see fig. 2).

Suddenly a small cumulus, somewhat rectangular in outline, about a mile to the northwest and apparently detached from the cloud band, showed unusual though not violent agitation as a strong updraft accelerated in the body of the cloud and a small horizontal roll developed along the nearer edge (figs. 3 and 4). The whole system drifted rapidly toward the north-northeast with the gale then prevailing. After about 20 seconds the small roll cloud elongated southwestward beyond the end of the cumulus and a small almost vertical vortex cloud appeared near the ground. Immediately thereafter small filaments of cloud raced northeastward along the upper edge of the roll cloud (fig. 5). This is the only instance I have seen or known about of a horizontal roll cloud becoming a tornado, and I watched it with unbelieving amazement. The bottom of this roll cloud rolled toward the parent cumulus, which is opposite to the rotation of the typical thundersquall roll cloud.

Several seconds more and the roll cloud had elongated into a true funnel, wider than before, inclined upward toward the northeast, and joined by a rather sharp elbow to the slender nearly-vertical tube at its southwestern end. This latter cloud reached to the ground, rotated cyclonically, and soon developed a cylindrical sheath of flying sand around its base, as in figure 6. All these developments, from figure 3 to figure 6, were extremely rapid and probably did not require more than 30 or 35 seconds. Figure 6 is the situation about the time several buildings were severely damaged; wind damage was more apparent than low-pressure damage. One brick cabin had the roof

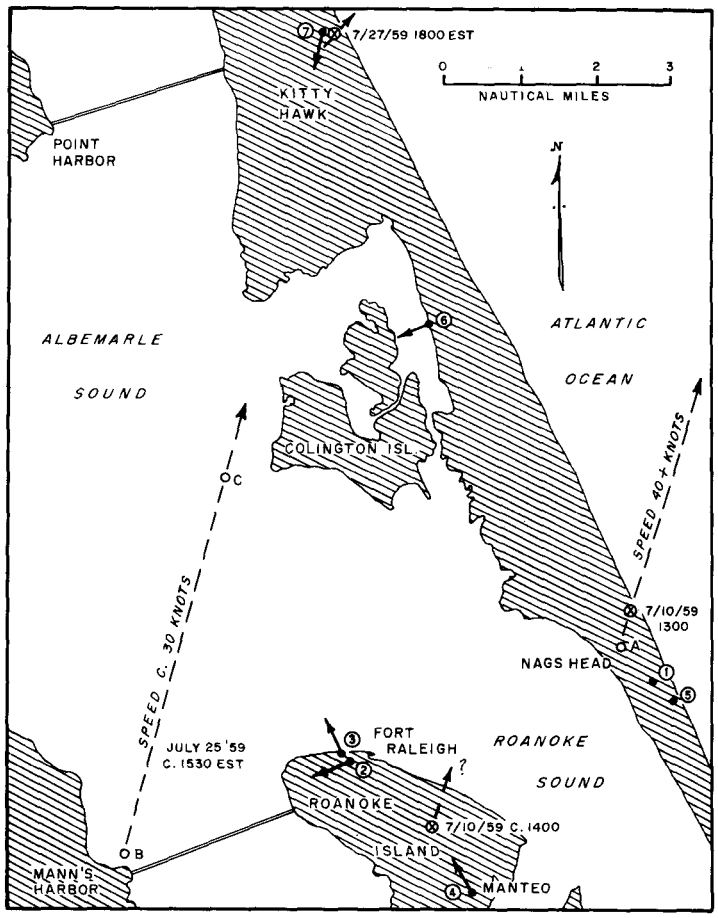

FIGURE 1.—Map showing locations of tornadoes and observers. Dashed arrows show estimated tracks of tornadoes or damaging winds.

- X Location of damage.
- A Location of tornadogenesis 7/10/59 (see also fig. 2).
- B Approximate location of tornado 7/25, first photo by Dan Morill.
- C Approximate location of tornado 10 min. after B, second photo by Dan Morill (fig. 9).
- 1 Location of F. B. Dinwiddie observing tornado of 7/10 (figs. 2–8).
- 2 Camera location and tornado bearing 7/25, first photo by Dan Morill.
- 3 Camera location and tornado bearing 7/25, second photo by Dan Morill (fig. 9).
- 4 Location and tornado bearing 7/25, Henry Eden.
- 5 Location 7/25 of anonymous viewer of tornado.
- 6 Location and tornado bearing 7/25 at time of dissolution, Mr. Morrison.
- 7 Location and tornado bearing 7/25, James W. Pace and sketches (figs. 10–17).

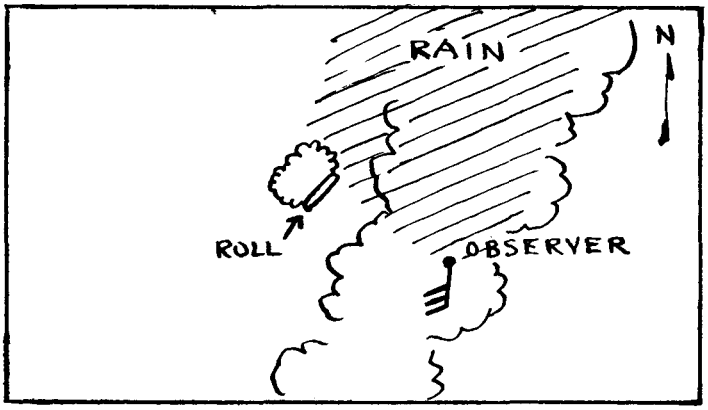

FIGURE 2.—Plan view of position of observer in relation to rain shower and cumulus cloud which developed a tornado funnel, 1300 EST, July 10, 1959.

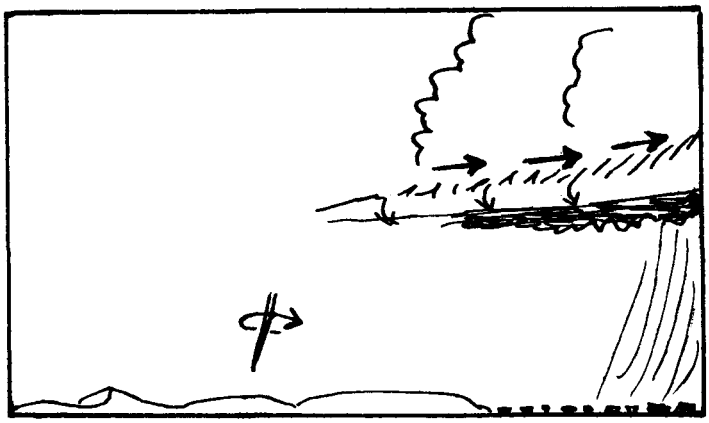

FIGURE 5.—Elongation of roll cloud beyond edge of cumulus and appearance of small vertically-oriented vortex cloud near the ground.

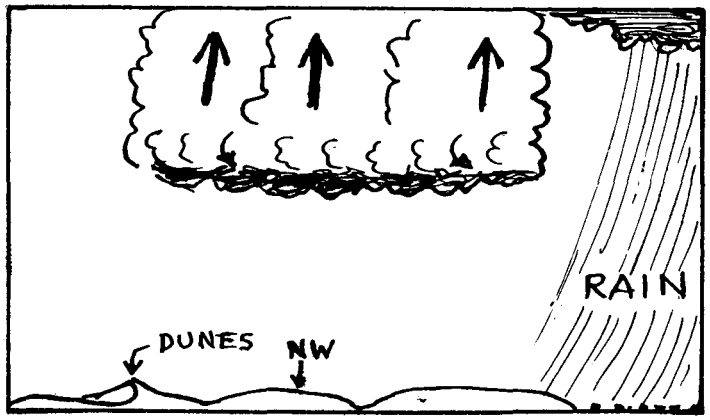

FIGURE 3.—Beginning of roll cloud development.

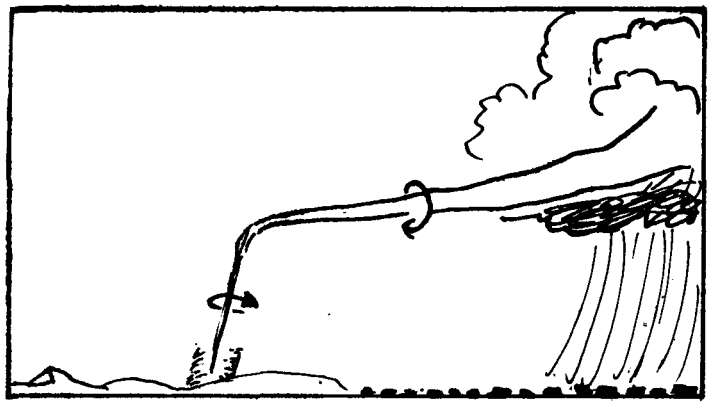

FIGURE 6.—The complete funnel. It was at this stage that severe damage to several buildings occurred.

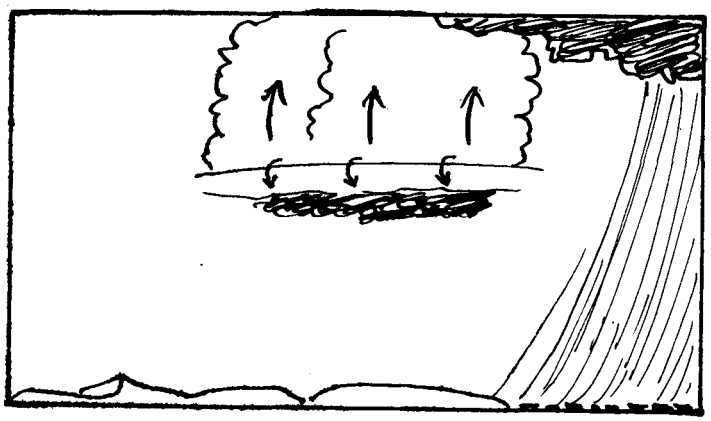

FIGURE 4.—Fully developed roll cloud.

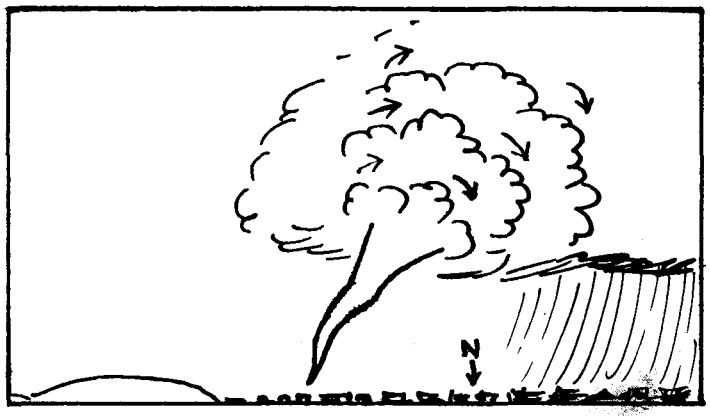

FIGURE 7.—The tornado moving away toward the north-northeast.

moved northeastward about 2 feet but left on the walls, and part of the southwestern wall blown inward. One frame cabin was blown partly off its foundation posts toward the northeast. One ticket booth for an amusement center was overturned and one brick chimney was blown off. The major damage was the collapsing of the front end, walls, and roof of a concrete-block recreation building. The front faced the west-southwest. Witnesses in another building described splintering sounds passing through the building as if every timber in the roof and walls was being shattered although no structural damage was apparent afterward.

As the tornado passed out to sea, moving north-northeastward, the funnel became thick at the top, and it was surrounded by several concentric edges of slowly turning cumulus, looking somewhat like the wrapped leaves at the

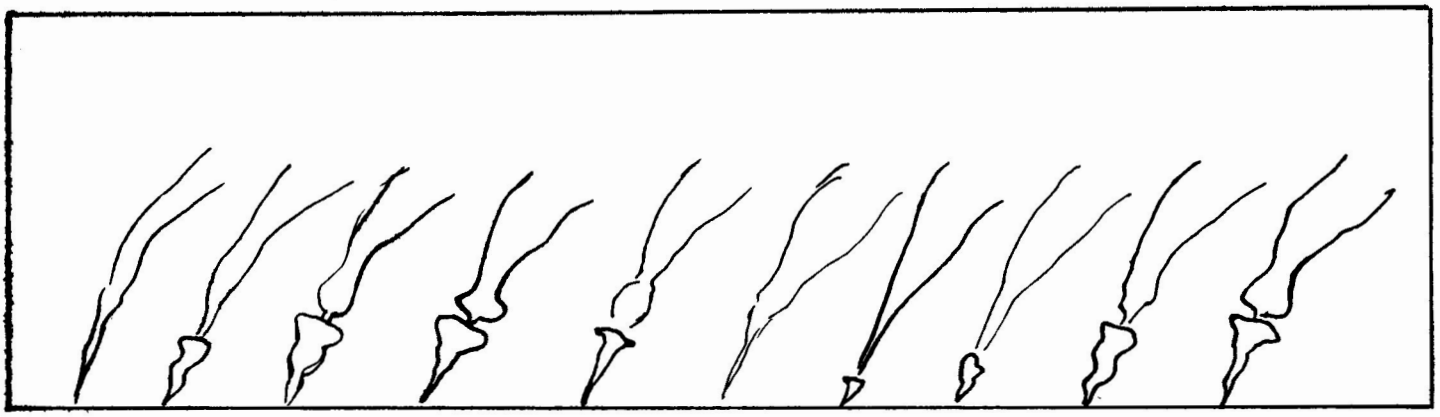

FIGURE 8.—Sketch of the successive thickenings which seemed to move up the funnel just after the stage of figure 6.

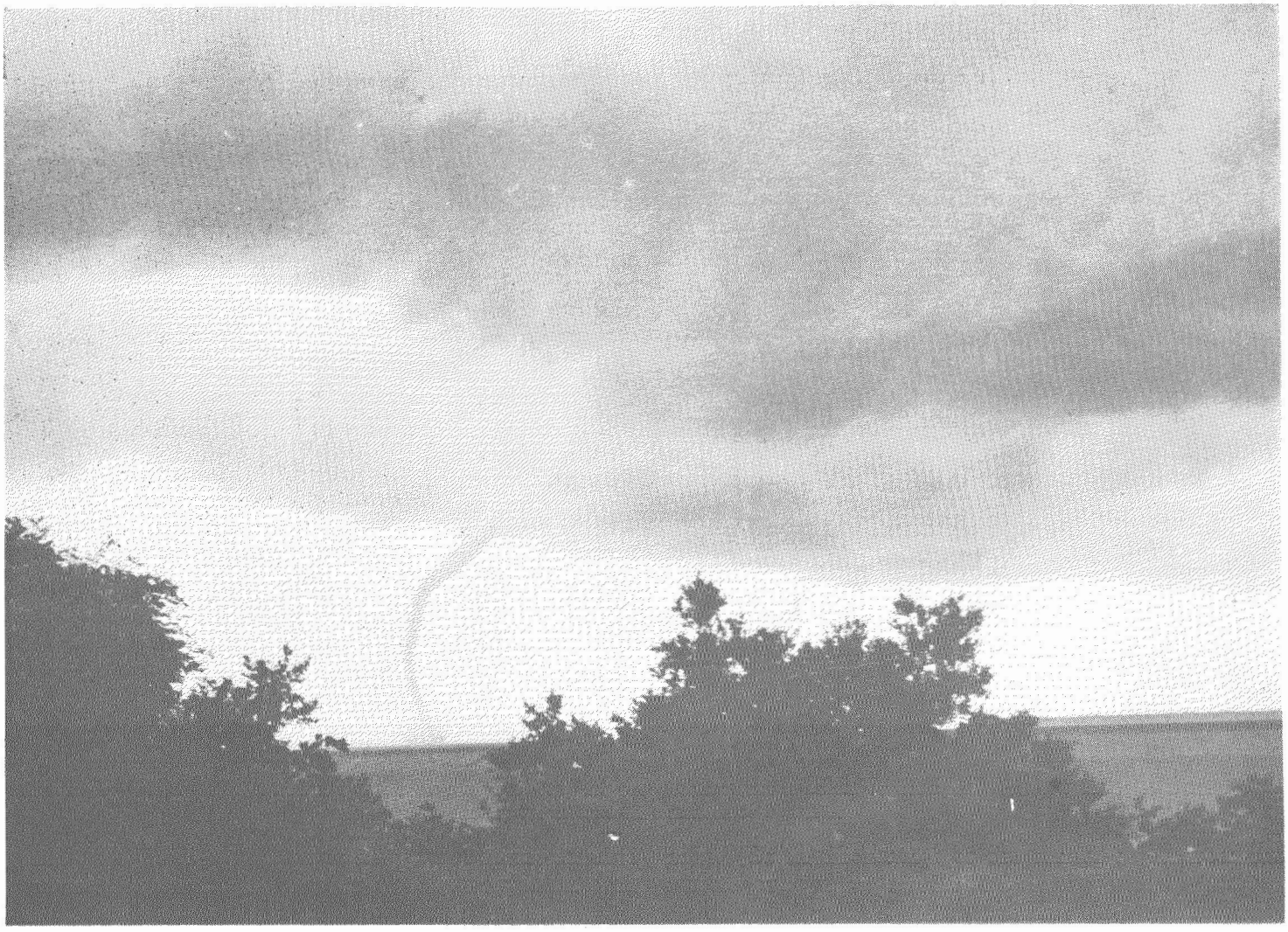

Photo by Dan Merill

FIGURE 9.—Photograph of funnel about 3:30 p.m. EST, July 25, 1959, looking north-northwest from Fort Raleigh, Roanoke Island, N.C. The spout dissipated a minute or two later.

end of a cigar (fig. 7). It was now joined to the massive cumulonimbus formation from which heavy rain was falling northeast of the tornado. The tornado was in view for about 15 minutes longer. At this stage (fig. 7) an important change took place in the action of the tornado. Small thickenings of the funnel began from the surface and grew upward, being cone-shaped with spiral ridges (fig. 8). When this formation reached about halfway up to the cumulonimbus base level, resistance to its further ascent developed in the funnel immediately above

in the form of bulbous protuberances. It looked as if a downdraft from above was opposing the updraft from below at this level. A typical sequence of this process is shown in figure 8, viewing from left to right. I saw a similar situation in a very large tornado-waterspout on August 10, 1953, which actually ejected cloud rings from protuberances developing about midway up the funnel cloud.

Also on July 10, 1959, tornado-like damage to electrical lines and poles was reported from 4 miles southwest of this station and about an hour after the disturbance described above, but I have not been able to verify any certain sightings of a funnel cloud. The next day, July 11, during a highly agitated squall cloud condition which produced some very strong localized winds 5 miles to the south-southwest at Manteo, N.C., one boy reported seeing a funnel cloud, but I personally saw none, though I scanned the sky with camera in hand.

Two weeks later, on July 25 at about 1530 EST, a large tornado-waterspout was observed near Colington Island, about 6 miles west-northwest of this station (fig. 1). Although I missed seeing it completely, it was seen by many people along the coast and in Manteo on Roanoke Island. Figure 9 is the second of two photographs of the funnel taken by Mr. Dan Morill from Roanoke Island (fig. 1). Very fortunately, the tornado-waterspout was sketched by Mr. James W. Pace, my art instructor and a man of well-trained powers of observation, as he viewed it from near Kitty Hawk (fig. 1). Figures 10 through 17 are copies of Mr. Pace's sketches, as he faced about south by west from about 5½ miles away.

Surface conditions an hour before the tornado and when rain began were: temperature 89° F., dewpoint 75° F., sea level pressure 30.07 inches, and wind light air from west-southwest. Prior to the onset of rain a band of cumulonimbus clouds had slowly developed overhead oriented west-southwest to east-northeast. During the rain squall here, about an hour before the tornado, the wind backed to southeast and east, which is unusual, with gusts to 22 m.p.h. There was no appreciable drop in dewpoint or permanent shift of wind after this disturbance, the wind afterward averaging about 8 m.p.h., from the southwest.

Beginning in figure 10 are the shape sequences of the tornado seen and sketched by Mr. Pace. Figure 10 shows a sheath beginning to grow downward around the cloud tube, reaching its maximum extension in figure 11. Two small poorly-formed pendant clouds are on either side of the main tornado cloud in figure 12 as it lifted temporarily. Rotation in these smaller clouds could not be verified. Figure 13 shows what Mr. Pace called the "dumping stage," as he thought it was "dumping water" back into the Sound. I think it likely that a downflow in the funnel cloud was responsible for the downward progress of the humps. Figures 14 and 15 show the weakening and terminal stages of the tornado. Figure 16 shows what Mr. Pace thought was a line of very slender but well-formed translucent tubes, which lasted about two minutes and

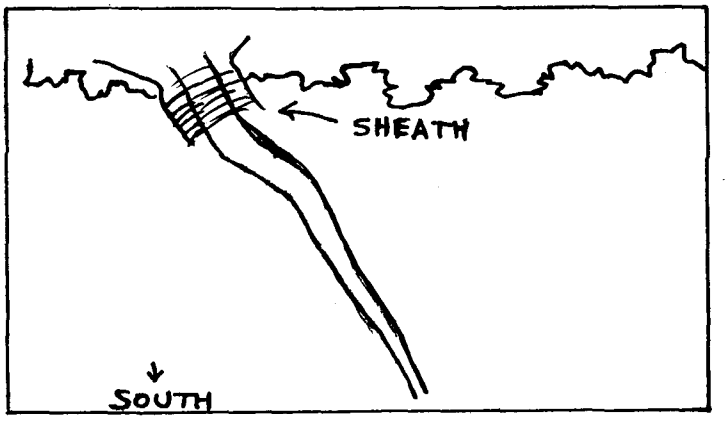

FIGURE 10.—Tornado cloud as seen by Mr. James W. Pace from about 5.5 miles distant near Kitty Hawk, about 1530 EST, July 25, 1959.

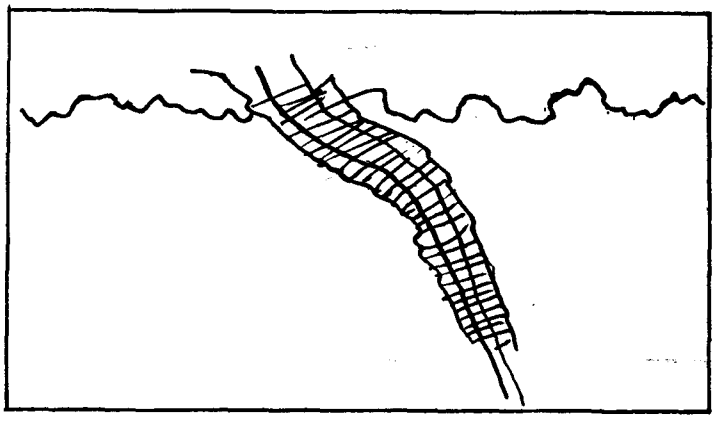

FIGURE 11.—Maximum extension of sheath around funnel shown in its beginning stage in figure 10.

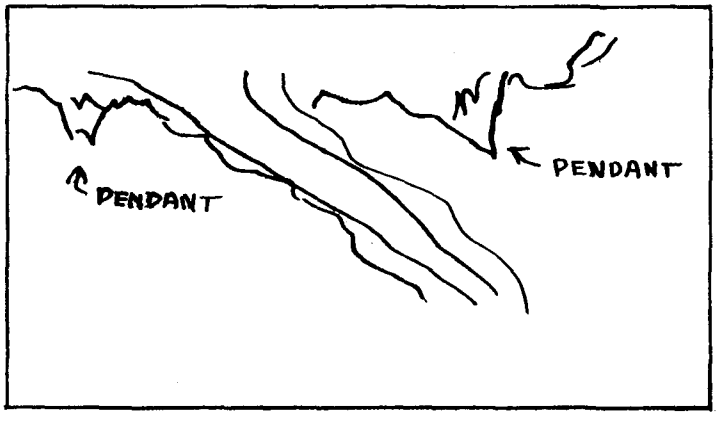

FIGURE 12.—Pendulous formations on either side of the funnel cloud.

appeared just after the main funnel disappeared. He admitted the possibility that these were thin streaks of rain, but did not think they were. The tornado was in view about 10 or 12 minutes.

Figure 17 is Mr. Pace's impression of a cloud of sand, probably whirling, through which he drove several minutes earlier in its formative moments, and which seemed to

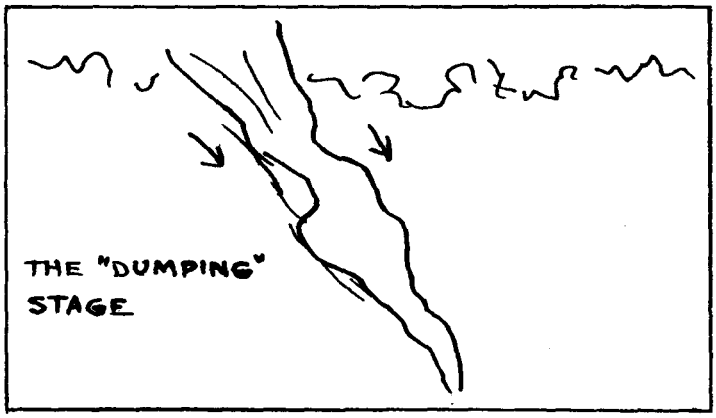

FIGURE 13.—A kind of down-flow apparent in the funnel.

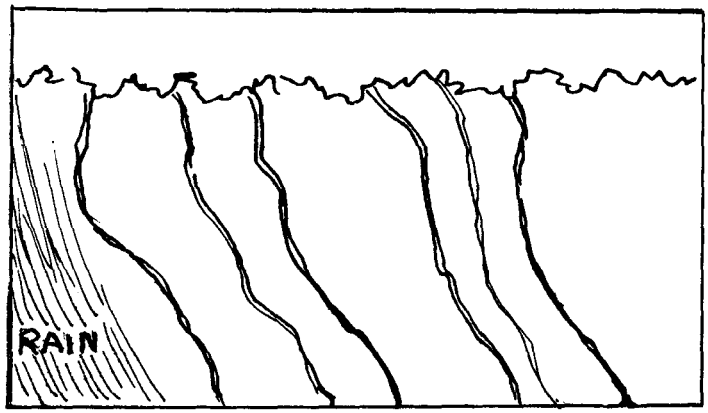

FIGURE 16.—Translucent tubes which appeared after main tornado funnel had disappeared.

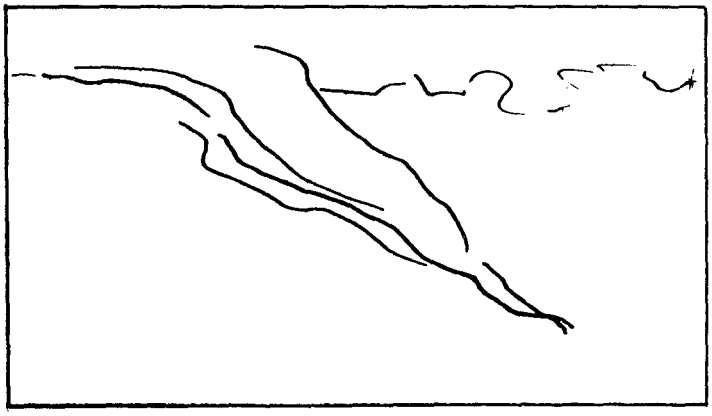

FIGURE 14.—Weakening of the tornado.

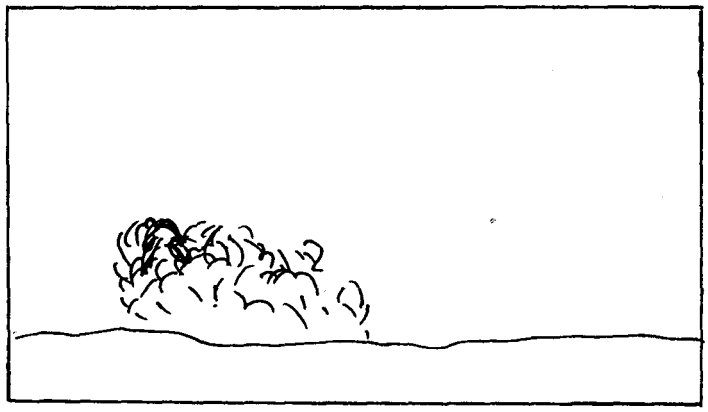

FIGURE 17.—Sand cloud 4 miles east or northeast of the tornado sketched in figures 10–16.

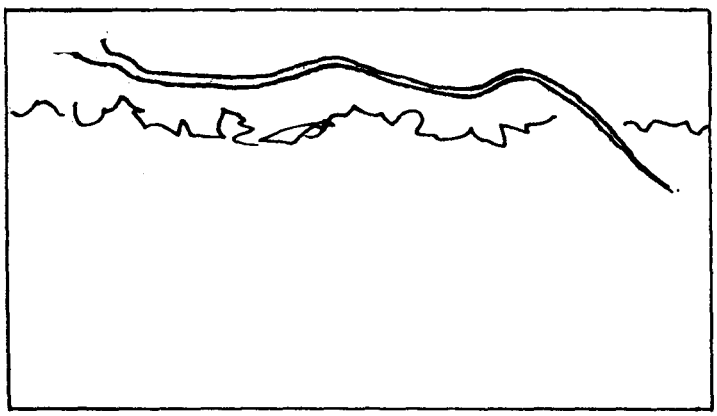

FIGURE 15.—Terminal stage of the tornado.

move very slowly thereafter. This sand cloud was 4 miles east or northeast of the tornado. No funnel cloud was observed near it.

Two days later, at 1800 EST July 27 and 400 feet from where Mr. Pace viewed this disturbance, wind damage occurred in a very small area, along Highway 158 at Kitty Hawk (fig. 1). The ceiling was blown down in a room of a motel, a door blown off, and a boat blown off its trailer, while across the road at a service station a refreshment stand was blown over a fence toward the northeast. The vending machines at the station were damaged and its plate glass windows were blown in from the southwest injuring three people. Oil cans were reported as flying through the air, but whirling motion or the sighting of a funnel cloud could not be verified. I drove by the spot 30 minutes later, but the rain was so heavy and visibility so poor that I was unaware of the damage. Severe lightning was also in progress at the time I passed, with the main body of the thunderstorm then out at sea to the northeast.